State of California

The Resources Agency

Memorandum

Date : July 25, 1997

F1-214

To : Lester Snow, Executive Director
CALFED Bay Delta Program
1416 Ninth Street
Sacramento, California 95814

From : **Department of Water Resources**

Subject: Category III Proposal

Enclosed please find a project proposal in response to the CALFED Bay Delta Program Category III Request for Proposals. This proposal is entitled: *Battle Creek Spawning Gravel Study and Restoration for the Winter-Run and Fall-Run Salmon, Lower Battle Creek.*

This proposal is one of two proposals related to ecosystem restoration along Battle Creek being submitted by the California Department of Water Resources, Northern District. The second proposal, also being submitted today, is entitled: *Engineering Investigation of Anadromous Fish Passage in Upper Battle Creek.*

Thank you very much for your consideration. If you have any questions, please call me at (916) 529-7342.

Naser J. Bateni, Chief
Northern District

Enclosure

97 JUL 28 PM 3:16
DWR MAPEHOUSE

I-004690

I-004690

F1 - 214

I. EXECUTIVE SUMMARY

TITLE OF PROJECT:

July 24, 1997

Battle Creek Spawning Gravel Study and Restoration for the Winter- Run and the Fall-Run Chinook Salmon, Lower Battle Creek.

PROJECT DESCRIPTION AND OBJECTIVE:

Restoration of Battle Creek is identified as item 16 by the Category III Steering Committee.

Battle Creek is an east side stream feeding into the Sacramento River near Red Bluff. The creek is dammed and diverted in a number of places, resulting in loss of spawning gravel recruitment. Only a couple of miles of the lower part of the creek is available for fall-run salmon spawning. Winter-run salmon also use this reach. This area is also below the Coleman National Fish hatchery. The area is heavily spawned. Last year as many as 80,000 salmon ascended Battle Creek, but the hatchery had room for only a small fraction, about 11,000 so the rest spawned in the limited riffle areas on top of other redds, or died.

This project does not deal with the area above the Coleman National Fish Hatchery but rather the area below the fish hatchery diversion dam. There are numerous opportunities to enhance and rehabilitate spawning riffles in this area. The stream reach between the diversion dam and Jellys Ferry Road is in numerous places too coarse for the salmon to successfully spawn in. Riffle morphology is generally limiting the amount of spawnable area. In this area we propose to place spawning size gravel to at least double and probably triple the amount of spawnable area.

APPROACH:

Spawning habitat in Battle Creek is limited by dams and diversions in the upper reaches that have trapped gravel, preventing recruitment to downstream reaches. This results in a coarse pavement on some of the riffles, in general too coarse for salmon to move during nest building.

The stream reach below Jellys Ferry Road has some excellent spawning gravel, but also areas that have been inundated with fine interstitial sediment. These areas will be ripped and shaped using a bulldozer to facilitate the removal of fines and to increase spawning area.

The first year of this project will be used to map riffles and to measure spawning gravel sizes by sieve analyses. Necessary county, Department of Fish and Game, and U.S. Corps of Engineers permits will be acquired. Environmental documentation will be prepared. A contract for the gravel placement will be prepared. In the spring of the following year, gravel placement, shaping, and ripping will begin and continue to the summer.

JUSTIFICATION:

The major goal of the Category III program is to increase the number of salmon spawning in

California rivers and to protect, preserve and restore riparian habitat throughout California. This project will more than double the amount of spawning habitat in Battle Creek below the hatchery. This will greatly increase the amount of natural spawning taking place in the creek. At present, because of spillover spawner from the hatchery, salmon spawn on top of areas already spawned, resulting in a high egg mortality. A large number of salmon die without spawning because of the limited amount of spawning area.

BUDGET:

The budget cost for this proposal is $445,000. No third party impacts are foreseen from the scope of this proposal. It will be implemented with the cooperation of both State and federal agencies.

APPLICANT QUALIFICATIONS:

DWR Northern District has been involved in a number of these types of projects already, mainly on the upper part of the Sacramento River, the Feather River, and on Clear Creek. We have a considerable amount of experience doing the preliminary analyses, the design, contracting, and inspection work. The project manager for this project is Koll Buer. He has over 18 years of experience in hydrogeology, geomorphology, and fishery restoration work. DWR has the equipment, technology, and resources to support this proposal.

MONITORING AND DATA EVALUATION:

The first year of the study includes data collection that can also be used by the Battle Creek Spring-run Chinook Working Group.

LOCAL SUPPORT:

DFG, USFWS and the local community have always been supportive of fishery restoration activities. This project will replace gravel that has been trapped in the upper reaches of Battle Creek, resulting in gravel spawning riffles too coarse for salmon to spawn in effectively.

II. TITLE PAGE

TITLE OF PROJECT:

Battle Creek Spawning Gravel Study and Restoration for the Winter Run Chinook Salmon and the Fall Run, Lower Battle Creek.

NAME OF APPLICANT:

Koll Buer- Senior Engineering Geologist
State Department of Water Resources
2440 Main Street
Red Bluff, California 96080
Phone: 916-529-7387 Fax: 529-7322

TYPE OF ORGANIZATION:

State Agency (tax exempt).

TECHNICAL AND FINANCIAL CONTACT PERSON:

As above.

PARTICIPANTS IN IMPLEMENTATION:

California Department of Fish and Game
U.S. Fish and Wildlife Service

RFP PROJECT GROUP TYPE:

The proposal fits in several of the identified types of projects. These include "construction", "aquatic and terrestrial restoration", and "monitoring, assessment and reporting".

III. PROJECT DESCRIPTION

PROJECT DESCRIPTION AND APPROACH:

Battle Creek is an east side stream feeding into the Sacramento River near Red Bluff. The creek is dammed and diverted in a number of places, resulting in loss of spawning gravel recruitment. Only a couple of miles of the lower part of the creek is available for fall-run salmon spawning. Winter-run salmon also use this reach. This area is also below the Coleman National Fish hatchery. The area is heavily spawned. Last year as many as 80,000 salmon ascended Battle Creek, but the hatchery had room for only a small fraction, about 11,000 so the rest spawned in the limited riffle areas on top of other redds, or died.

This project does not deal with the area above the Coleman National Fish Hatchery but rather the area below the fish hatchery diversion dam. There are numerous opportunities to enhance and rehabilitate spawning riffles in this area. The stream reach between the diversion dam and Jellys Ferry Road is in numerous places too coarse for the salmon to successfully spawn in. Riffle morphology is generally limiting the amount of spawnable area. In this area we propose to place spawning size gravel to at least double and probably triple the amount of spawnable area.

The project would begin directly after project approval. During the first year, project plans, design, and permits would be done. Gravel surveys and sieve analyses would determine the areas to be ripped and the riffles to be improved using gravel placements. Environmental documentation would be prepared. A contract for delivering gravel would be bid. One of the requirements of the contract bid would be that gravel would be mined from an out-of-stream area so as to minimize impacts on other riparian systems.

Construction would begin in the spring of the next year by shaping riffles, ripping cobbly areas and by placing gravel on riffles.

The spawning gravel would be transported by truck to riffle sites and emplaced using a skip loader. Bulldozers would be used to shape and rip, and skiploaders would be used to bring in soil and other habitat elements.

LOCATION OF PROJECT:

The study area is in the lower part of Battle Creek, between the mouth where it enters the Sacramento River and the area below the Coleman National Fish Hatchery.

EXPECTED BENEFITS:

The first year of the project will provide information on gravel quality and sediment transport in Battle Creek. The second year will provide additional spawning gravel habitat for both the winter-run and fall-run salmon.

BACKGROUND AND TECHNICAL JUSTIFICATION:

Between 1900 and 1912, Battle Creek was developed into one of the West's earliest hydroelectric systems. Construction of a series of small diversions, several long canals, and low

volume - high head power generators made Battle Creek a highly efficient power generation system.

There are at least five diversions that affect the movement of spawning gravel, either by trapping gravel behind the diversion or by removing flow that would move the gravel downstream. Spawning size gravel below the dams and diversions is washed away over time, resulting in spawning riffles armored with cobbles too coarse for the salmon to move.

A preliminary spawning gravel quality survey showed that the upper part of the study reach was too coarse for ideal spawning conditions, and that the lower reach was impacted by interstitial fines.

PROPOSED SCOPE OF WORK:

Parts of Battle Creek were recognized as being too coarse for successful spawning in the "Upper Sacramento River Spawning Gravel Study" and accompanying river atlas. Reconnaissance field work has confirmed that riffles below the hatchery are too coarse for salmon spawning.

The first part of this project will document areas requiring rehabilitation. Data collection will include an extensive program of spawning gravel sampling and analysis. Numerous samples of 500 to 700 pounds each will be collected, sieved, and plotted on mechanical analysis graphs. The percent fines will be calculated. The sample will be compared to ideal spawning gravel.

The sampling program will be used to determine the need for spawning gravel rehabilitation. Where the gravel is too coarse, a mix of spawning size gravel will be brought in. In areas that are too fine, riffle ripping in conjunction with geomorphic solutions will be used to move the fines downstream.

The proposed scope of work includes the following tasks:

- TASK 1 - Preparing a topographic stream survey map of the reach to be used to plot riffle areas, sampling sites, rehabilitation sites, spawning activity and etc.
- TASK 2 - Researching and documenting previous rehabilitation activities and placing the location of these activities on the map.
- TASK 3 - Conducting field surveys to identify all the spawning riffles.
- TASK 4 - Sampling spawning riffles using the Wolman method to determine the size distribution of the surface, and using bulk sampling to determine the coarseness of the underlying spawning gravel. Most of the gravel sample will be sieved on-site, but the finer part of the sample will be brought back to the laboratory for further analysis.
- TASK 5 - Results of the sampling will be analyzed and compared to ideal spawning gravel. Results will be plotted on the map and on graphs to show the areas requiring gravel rehabilitation. The data will then be used to develop a rehabilitation plan that will include the import of spawning gravel, placement of spawning gravel on riffles, riffle ripping, and geomorphic alteration of the stream banks and bed.
- TASK 6 - Environmental documentation will be prepared and the required permits

obtained. It is expected that a full Environmental Impact Report will not be necessary. Permits that will be required will include a DFG Section 1600 Agreement, U.S. Corps of Engineers Section 404 and Section 10 permits, County permits, and others. Contract specifications for each of the rehabilitation sites, including maps and drawings, will be prepared for each of the sites. An outside contract will be prepared for a construction firm to do the actual work.

- TASK 7 - This task includes the actual construction. DWR will provide the construction inspection. The project will be managed by the State Department of Water Resources, Northern District with the assistance of the Environmental Services Office, and the State Department of Fish and Game. DWR will provide all the project planning, design work, contract preparation, and some of the construction work. DFG will provide guidance and some of the construction inspection. A private construction company will place the gravel, rip and shape riffles under DWR and DFG supervision.

MONITORING AND DATA EVALUATION:

Development of the spawning gravel data will aid the DFG and USFWS in managing Battle Creek's fishery. The actual restoration work will be carefully monitored during construction and for a number of seasons thereafter.

IMPLEMENTABILITY:

This type of project has been accomplished in a number of places in the past. These places include the upper Sacramento River below Keswick Dam, the Feather River below Oroville, the Klamath River below Irongate Dam, the Trinity River below Claire Engle Dam, and others. It is recognized that the riffle restoration below these facilities requires some maintenance activities over the years to repair damage caused by storms.

IV. COSTS AND SCHEDULE

BUDGET COSTS:

The project would be staged over two years and cost $195,000 the first year and $250,000 the second year for a total of $445,000. The first year would consist of project planning, riffle mapping, sieve analyses, design work, permit applications, contract preparation and etc. The spring of the second year will consist of construction and construction inspection. The summer, fall and winter will consist of project monitoring.

TASK	DIRECT LABOR	SALARY & BENEFITS	OVERHEAD	MATERIALS & CONTRACTS	TOTAL COSTS
1		$20,200	$24,800		$45,000
2		$11,200	$13,800		$25,000
3		$6,700	$8,300		$15,000
4		$20,200	$24,800		$45,000
5		$9,000	$11,000		$20,000
6		$20,200	$24,800		$45,000
7		$33,600	$41,400	$175,000	$250,000
Total					$445.000

Funding partners may include the Department of Fish and Game and the Department of Water Resources.

SCHEDULE MILESTONES:

The following table lists anticipated completion dates for the seven tasks.

Task Number	Completion Date
1	February 1, 1998
2	March 15, 1998
3	July 15, 1998
4	August 15, 1998
5	November 15, 1998
6	March 15, 1999
7	August 15, 1999

THIRD PARTY IMPACTS:

No third party impact are foreseen from the scope of this proposal. It will be implemented with the cooperation of the USFWS, DFG, and other Resource Agencies.

V. APPLICANT QUALIFICATIONS

The project will be conducted by staff of the Northern District DWR in collaboration with staff from DFG and USFWS. Collaborators will provide input through periodic Working Group meetings and the design review process. DFG will also approve of the engineering designs.

This project will be directed by Koll Buer, Senior Engineering Geologist, in charge of the Geology Section of the Northern District. Dave Forwalter will be the lead geologist and Jon Anderson for the project. Environmental and fisheries aspects will be handled by the Northern District Environmental Studies Section and DFG.

Koll Buer

Koll Buer, Senior Engineering Geologist, earned his B.S. Degree in geology from the University of California, Davis in 1972, and his Masters Degree in 1977. He is a Registered Geologist and a Certified Engineering Geologists. He has been working with spawning gravel, stream geomorphology, and watersheds for the last 18 years. Some of the more recent projects that he has directed include the *Sacramento River Gravel Study, the Sacramento River Bank Erosion Investigation*, the *Use of Alternative Gravel Sources for Fishery Restoration*, and many others that are detailed in our list of pertinent projects and studies relating to this proposal.

Dave Forwalter

Dave Forwalter, Associate Engineering Geologist, earned his Bachelors Degree in Geology at California State University, Chico in 1983. He has been involved in river studies since 1986 and has worked on numerous fishery-related studies including the *Sacramento River Bank Erosion Study, the Clough Dam Spawning Gravel Project, Enlarged Lake Cachuma- Santa Ynez River Degradation Study*. He has also done work for DFG at the Little River and on Cottonwood Creek.

Noel Eaves

Noel Eaves, Associate Engineering Geologist, earned her Bachelors Degree in Geology from the University of California, Davis in 1978. She also did two years of post-graduate work in geomorphology. She has been involved in river studies for 16 years and she has worked on numerous watershed and fishery studies including the Feather, Sacramento, Eel, and the San Joaquin River system.

The following is a list of pertinent projects and studies relating to this proposal:

Eaves, Noel. "Feather River Gravel Study- Fish Diversion Dam to Honcut Creek". DWR-ND Draft Memorandum Report. 37 pages, with data appendices. December, 1996.

Buer, K. "Sacramento River Gravel Study- Keswick Dam to Cottonwood Creek". DWR-ND Memorandum Report. 46 pages, with data appendices. October, 1995.

Buer, K. and Forwalter, D. "Sacramento River Bank Erosion Investigation, Red Bluff to Colusa, California". DWR-ND Draft Progress Report. With plates, 240 pp. September, 1994.

Buer, K., Weherly, K., and Cockrill, E. "Use of Alternative Gravel Sources for Fishery Restoration and Riparian Habitat Enhancement, Shasta and Tehama Counties, California." Prepared for the Department of Fish and Game. 197 pp. with plates and appendices. August 1994.

Buer, K. "Hayfork Creek- Murrison Dam Investigation". DWR Draft Memorandum. 55pp. July 1992.

Buer, K. and McMillan, J. "Westside Tributary Watershed Erosion Study, Executive Summary". DWR-ND District Report. 98 pp. December 1992.

Buer, K., Forwalter, D., and Kissel, M. Senate Bill 1086, "Spawning Gravel and Erosion Study". DWR-ND preliminary report prepared for the Department of Fish and Game. October 1987.

---. "Woodson Bridge State Recreation Area-Palisade Project Field Test, Composition of Eroding Banks". DWR-ND Memorandum Report prepared for the Reclamation Board. 46 pp. May 1986.

-----. "Executive Summary - Sacramento River Spawning Gravel Studies". DWR-ND District Report prepared for California Department of Fish and Game. 50 pp. June 1985.

Buer, K., Eaves, N., and McMillan, J. "Middle Sacramento River Spawning Gravel Study", with River Atlas. DWR-ND District Report prepared for California Department of Fish and Game. 196 pp. August 1984.

Buer, K., Eaves, N., Scott, R., and McMillan, J. "Basin Changes Affecting Salmon Habitat in the Sacramento River". Conference Proceedings, Pacific Northwest Stream Habitat Workshop. American Fishery Society. October 1984.

-----. "Enlarged Shasta Dam, Downstream Geomorphic Changes--Preliminary Report. DWR-ND Memorandum Report. 50 pp. Includes a river atlas showing geomorphic changes. June 1983.

Buer, K., and Senter, E. "South Fork Trinity River Salmonid Habitat Enhancement Studies". DWR-ND District Report prepared for California Department of Fish and Game. 190 pp. March 1982.

Buer, K. "Klamath and Shasta Rivers Spawning Gravel Enhancement Study". DWR-ND District Report prepared for California Department of Fish and Game. 140 pp. with maps and plates. 1981.

Buer, K., Scott, R., Parfitt, D., Serr, E., Haney, J., and Thompson, L. "Spawning Gravel Enhancement Studies on Six Northern California Rivers". In: Watershed Rehabilitation in Redwood National Park and Other Pacific Coastal Areas. Symposium Proceedings. August

24-28, 1981.

Parfitt, D. and Buer, K. "Chinook Salmon Spawning Enhancement Potential in the Upper Sacramento River". In: Propagation, Enhancement, and Rehabilitation of Anadromous Salmonid Populations and Habitat Symposium. October 15-17. American Fishery Society. 1981.

-----. "Upper Sacramento River Spawning Gravel Study". DWR-ND District Report prepared for California Department of Fish and Game. 160 pp. with maps and plates. 1980.

----. "Woodson Bridge State Recreation Area Bank Erosion Study". DWR-ND Memorandum for the Department of Parks and Recreation. 52 pp. 1979.

Rowe, W., and Dawson, D. "San Joaquin River Tributaries Spawning Gravel Assessment". DWR-ND Memorandum Report prepared for DFG. 34 Pages with data appendices. November 1994.

Koch, E. "South Fork Trinity River Sediment Investigation". DWR-ND District Report. February 1992.

-----. "Little River, Channel Realignment Feasibility Study". DWR-ND Memorandum Report prepared for California Department of Fish and Game. 55 pp. June 1987.

Eaves, Noel. "Feather River Spawning Gravel Baseline Study". DWR-ND District Report. 1982.

Eaves, Noel. "Monitoring Spawning Habitat, Feather River, California. DWR-ND Memorandum Report. July 1983.